Charan Uthaman

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Education

University of Massachusetts, Amherst **Sep 2026 - Present**
M.S. in Computer Science | Coursework: ML, Neural Networks, Software Engineering

Amrita Vishwa Vidyapeetham **Sep 2022 - May 2026**
Major: B.Tech. in Electronics and Communication Engineering
Minor: Artificial Intelligence and Machine Learning

Research/Work Experience

Comcast, *Chennai, TN, India* **Mar 2026 - Jul 2026**
AI Intern

- Evaluated open-source frameworks for AI-driven Virtual Product Placement and video editing in large-scale media.
- Built data pipelines and tool-based workflows for an Agentic AI remediation platform using ADK and Langfuse.
- Migrated and containerized the platform with Docker and Kubernetes; documented system architecture and setup.

Carnegie Mellon University, *Pittsburgh, PA, USA* **Feb 2025 - Dec 2025**
Research Intern under Dr. Roger B. Dannenberg

- Implemented band-limited oscillators in C++ using polynomial approximation and lookup tables to reduce aliasing in ARCO, a real-time sound synthesis engine, and fixed CMake build issues to enable Windows support.

Medsby Healthcare and Engineering Solutions, *Coimbatore, TN, India* **May 2025 - Jun 2025**
Project Engineer Intern

- Built an IMU-based motion tracking system with a real-time HTML dashboard for physiotherapy analysis, and rigged a 3D Blender character to mirror IMU rotations for patient rehabilitation.

AIMA Laboratory, Amrita Vishwa Vidyapeetham, *Coimbatore, TN, India* **Jul 2024 - Dec 2025**
Research Assistant

- Co-led de-identified ultrasound/mammogram data acquisition with AIMS, Kochi, aligned with pathology reports.
- Trained nnU-Net models for breast ultrasound tumor segmentation (Dice 0.766 on BUSI), scheduled for pilot testing at Cachar Cancer Hospital, Assam.
- Guided new student contributors by translating clinical objectives into annotation and preprocessing tasks.

Publications

DeepMSI: A Deep Learning Framework for Predicting Microsatellite Instability from Whole-Slide Histology and Tumor Genomic Markers for Endometrial Cancer (First author, accepted in ICAIHC 2026) **Jul 2025 - Jan 2026**

- Built a weakly supervised ResNet50 attention-MIL + GCN framework predicting MSI from whole-slide images (97.13% AUROC, 96.67% validation recall), with interpretable attention maps.

ADMM-Based Model Compression for Real-Time Breast Ultrasound Segmentation on FPGA Systems (First author, manuscript in preparation) **Jun 2025 - Jan 2026**

- Developed ADMM-based structured channel pruning for nnU-Net targeting FPGA/edge deployment, prototyped on a PyTorch CNN (MNIST, 80% sparsity) before breast ultrasound segmentation.
- Reduced parameters by 95.1% (46.3M to 2.27M) and model size by 97.5% (353.65 MB to 8.76 MB) on BUSI, keeping Dice at 0.752 vs. 0.766 baseline and improving HD95 by 31.5%.

Projects/Research

P4-Assisted, Multi-Vector DDoS Detection Framework with Deep Learning in Software-Defined Networks **Jul 2025 - Jan 2026**

- Designed a P4-enabled SDN pipeline for real-time flow-feature extraction, and trained Random Forest and CNN detectors for Slowloris DDoS attacks (96% and 91% F1, about 25 s detection).

Technical Skills

Languages: Python, C, C++, Embedded C, VHDL

AI/ML: PyTorch, TensorFlow/Keras, scikit-learn, Hugging Face, OpenCV, nnU-Net, CNNs, Graph Neural Networks (GCN), Computer Vision, Image Segmentation, Model Compression (ADMM Pruning), NumPy, pandas

GenAI/Agentic: LangChain, ADK, Langfuse, OpenAI and Gemini APIs, RAG

Systems/Tools: Linux, Git, Docker, Kubernetes, CUDA, HPC, CMake, P4, Mininet, FPGA (Basys3 Artix-7), Blender